

REMARKS

An excess claim fee payment letter is submitted herewith for three (3) additional independent claims.

Claims 1-30 are all the claims presently pending in the application. Claims 1, 10, and 19 have been amended to more clearly define the invention and claims 28-30 have been added. Claims 1, 10, 19, and 28-30 are independent.

These amendments are made only to more particularly point out the invention for the Examiner and not for narrowing the scope of the claims or for any reason related to a statutory requirement for patentability.

Applicant also notes that, notwithstanding any claim amendments herein or later during prosecution, Applicant's intent is to encompass equivalents of all claim elements.

Claims 1-27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Applicant's admitted prior art (hereinafter "AAPA") and the Yamakita et al. reference (U.S. Patent Application Publication No. 2002-0154262).

This rejection is respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

A first exemplary embodiment of the claimed invention, as defined, for example, by independent claim 1, is directed to an in-plane switching type liquid crystal display unit which includes a pair of substrate structures and a liquid crystal layer. The pair of substrate structures have at least plural pixel electrodes and a common electrode on one of the substrate structures.

The liquid crystal layer is sandwiched between the substrate structures and has a splay elastic coefficient within the range of 6 to 25 pico-newtons for improving the luminance of the in-plane switching type liquid crystal display unit.

A second exemplary embodiment of the claimed invention, as defined, for example, by independent claim 10, includes a liquid crystal layer having a bend elastic coefficient within the range of 5 to 20 pico-newtons for improving the luminance of the in-plane switching type liquid crystal display unit.

A third exemplary embodiment of the claimed invention, as defined, for example, by independent claim 19, includes a liquid crystal layer having a splay elastic coefficient and a bend elastic coefficient such that a square root of the product of the bend elastic coefficient and the splay elastic coefficient within the range of 5 to 20 pico-newtons for improving the luminance of the in-plane switching type liquid crystal display unit.

A fourth exemplary embodiment of the claimed invention, as defined, for example, by independent claim 28, is directed to a method of providing an in-plane switching type liquid crystal display unit. The method includes providing a pair of substrate structures that includes at least plural pixel electrodes and a common electrode on one of the substrate structures, improving a luminance of the in-plane switching type liquid crystal display unit by selecting a liquid crystal material having a splay elastic coefficient that is equal to or greater than 6 pico-Newtons and less than or equal to 25 pico-Newtons, and providing the selected liquid crystal material between the substrate structures.

A fifth exemplary embodiment of the claimed invention, as defined, for example, by

independent claim 29, is directed to a method of providing an in-plane switching type liquid crystal display unit. The method includes providing a pair of substrate structures that includes at least plural pixel electrodes and a common electrode on one of the substrate structures, improving a luminance of the in-plane switching type liquid crystal display unit by selecting a liquid crystal material having a bend elastic coefficient that is greater than or equal to 5 pico-Newtons and less than or equal to 20 pico-Newtons, and providing the liquid crystal material between the substrate structures.

A sixth exemplary embodiment of the claimed invention, as defined, for example, by independent claim 30, is directed to a method of providing an in-plane switching type liquid crystal display unit. The method includes providing a pair of substrate structures that includes at least plural pixel electrodes and a common electrode on one of the substrate structures, improving a luminance of the in-plane switching type liquid crystal display unit by selecting a liquid crystal material having a splay elastic coefficient and a bend elastic coefficient that satisfies the following equation: $5 \text{ pico-Newtons} < \text{SQRT} < 20 \text{ pico-Newtons}$, and providing the liquid crystal material between the substrate structures.

Conventional in-plane switching type active matrix liquid crystal display units experience problems of low luminance which is derived from a low aperture ratio and non-transparent comb-like electrodes (page 2, lines 3-10). One conventional approach to this problem is to provide pixel electrodes with waved teeth. However, the fabrication process for this method is complicated (page 2, lines 11 - 17).

The inventor discovered that low luminance is due not only to the low aperture ratio but

also a weak anisotropy of refractive index of the liquid crystal layer. In particular, the inventor realized that a portion of the local electric field in the liquid crystal of the pixel is vertical (normal) rather than parallel to the substrates (page 3, lines 1 - 11).

As shown in Fig. 2, the local electric field in the periphery of the common/pixel electrodes 53/58 is not parallel to the substrate 300. Rather, it is more vertical. The liquid crystal molecules 370 in this portion are arranged in a spray pattern which lowers the luminance. While conventional display units may have compensated by adjusting the twist elastic coefficient, neither of the splay elastic coefficient nor the bend elastic coefficient were taken into account. Therefore, the present invention is directed to improving luminance by selecting the splay elastic coefficient and/or the bend elastic coefficient for the liquid crystals so that the luminance of the liquid crystal is improved. (page 7, lines 4-5).

II. THE PRIOR ART REJECTION

Regarding the rejection of claims 1-27, the Examiner alleges that the Yamakita et al. reference would have been combined with the Applicant's Admitted Prior Art (AAPA) to form the claimed invention.

Applicant respectfully submits that the Yamakita et al. reference is not prior art.

They Yamakita et. al. reference is a U.S. application publication of a Continuation of Application No.10/009,522 filed on December 11, 2001 which was filed under §371 of International Application No. PCT/JP00/03815. That International Application was not filed on or after November 29, 2000. Therefore, the Yamakita et al. reference is only available as of the

publication date of October 24, 2002, which is after the present application filing date of August 20, 2001 and well AFTER the August 22, 2000 priority date of the present application.

Thus, the Yamakita et al. reference is not available as prior art against the present application and the Examiner is respectfully requested to withdraw this rejection of claims 1-27.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully submits that claims 1-30, all the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the Application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

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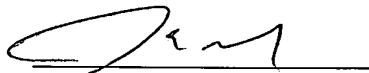
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The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: _____

6/9/07



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